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Abstract

NEUTRON-PHYSICAL CHARACTERISTICS OF REACTOR SYSTEMS WITH BERYLLIA AND BERYLLIUM MODERATORS

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The paper describes the results of the experimental study of the neutron-physical characteristics of systems with Be and BeO moderators. The results of critical experiments are given for systems of the following two types:

1. Systems close to homogeneous ones with highly enriched uranium.

2. Heterogeneous lattices using natural and slightly enriched uranium.

For systems of the first type the experiments included the investigation of the critical parameters, neutron spectrum, effect of the reflectors, etc, at widely varying concentrations of the fissionable material and geometrical characteristics of the assemblies (from fast to thermal spectra); investigation of the dynamic characteristics of the systems; investigation of the effectiveness of control components made of various materials depending on their position in the critical assemblies.

The multi-group methods of calculation of such assemblies were corrected on the basis of the experimental data.

For systems of the second type the experiments included the investigation of the critical parameters of the lattices (K_∞ and its co-factors), space-energy distribution of the neutrons in the cell with the aid of a mechanical selector. Contribution to K_∞ made by the reactions $(n, 2n)$ and (γ, n) on beryllium is assessed. In the case of pure moderators the paper gives the results of the experiments in finding neutron age up to various energies, square diffusion length diffusion constant, etc.

The impulse method of studying the system characteristics was used in the experiments among other methods.

The results of calculations showing the importance of (n,2 n)process in neutron multiplication in the reactor are given in the paper.

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